

REMARKS

In the Office Action, the Examiner:

- a) objected to claim 15 for informalities;
- b) rejected claims 9 and 15 under 35 U.S.C. § 102(e) as being anticipated by Naruoka (US 2003/0113941 , "Naruoka");
- c) rejected claims 6, 9, 10, 12-14, 23, 24, 32, and 33 under 35 U.S.C. § 102(e) as being anticipated by Barge et al. (US 2005/0208322, "Barge");
- d) rejected claims 8, 11, 25, and 34 under 35 U.S.C. § 103(a) as being unpatentable over Barge in view of Sato (US Patent No. 6,143,629, "Sato");
- e) rejected claim 22 under 35 U.S.C. § 103(a) as being unpatentable over Barge in view of Chiang et al. (US 2005/0092348, "Chiang"); and
- f) objected to claims 16-21 as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants gratefully acknowledge the Examiner's indication of allowable subject matter in claims 16-21.

By this amendment, Applicants have amended claim 11 to more appropriately define the present invention, and have amended claims 8, 15, and 32 to correct informalities and typographical errors. Applicants have also added new claims 35 and 36 to protect additional aspects of the present invention. Claims 6 and 8-36 are pending in the above-identified application, of which claims 6, 8-25, and 32-36 are presented for examination.

Applicants respectfully traverse the Examiner's rejection of claims 9 and 15 under 35 U.S.C. § 102(e) as being anticipated by Naruoka. In order to properly establish that Naruoka anticipates Applicants' claimed invention under 35 U.S.C. § 102, each and every element of each of the claims in issue must be found, either expressly described or under principles of inherency, in that single reference. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." See M.P.E.P. § 2131, quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

Naruoka fails to teach each and every element recited in claim 9. In particular, Naruoka does not teach, at least, the claimed method of inspecting a semiconductor wafer which "comprises a film constituting a device structure including a device pattern," and "removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer," as recited in claim 9.

The Examiner alleges that Naruoka discloses "removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer; selectively removing a surface layer of the semiconductor wafer by selective etching without dicing to bring the crystal defect into view; and quantitatively evaluating the crystal defect (see paragraph 0005)." Office Action at pages 2-3. Paragraph [0005] of Naruoka addresses a preferential etching process of a semiconductor substrate. However, the method disclosed in paragraph [0005] of Naruoka is a "method of evaluating a crystal defect occurring during manufacture of a semiconductor substrate," which discloses a two-step process in which "first, crystal defects are detected...by performing a preferential etching process," and "[t]hereafter...simply count the crystal defects." Therefore, the

device in Naruoka undergoing such preferential etching process is a semiconductor substrate, which does not have a film including a device pattern, and thus cannot disclose removing the film. Accordingly, Naruoka fails to disclose the claimed “semiconductor wafer which comprises a film constituting a device structure including a device pattern,” and “removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer,” as recited in claim 9.

Since Naruoka does not disclose each and every element recited in claim 9, Naruoka cannot anticipate claim 9 under 35 U.S.C. § 102(e). Accordingly, claim 9 is allowable over Naruoka at least for this reason, and claim 15 is also allowable over Naruoka at least due to its dependence from claim 9. Thus, the 35 U.S.C. § 102(e) rejection of claims 9 and 15 should be withdrawn.

Applicants respectfully traverse the Examiner’s rejection of claims 6, 9, 10, 12-14, 23, 24, 32, and 33 under 35 U.S.C. § 102(e) as being anticipated by Barge. Barge fails to teach each and every element recited in independent claim 9, because Barge also does not teach the claimed method of inspecting a semiconductor wafer which “comprises a film constituting a device structure including a device pattern,” and “removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer,” as recited in claim 9. The Examiner alleges that Barge discloses “removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer; selectively removing a surface layer of the semiconductor wafer by selective etching without dicing to bring the crystal defect into view; and quantitatively evaluating the crystal defect (0081-0085).” See Office Action at page 3.

Barge discloses a technique for displaying defects using a Secco type solution comprising Stages A through D. However, as stated in paragraph [0081] of Barge, the process entails “starting from an SOI substrate 1 composed of 2000 Å of silicon on 4000 Å of silicon oxide.” Therefore, the technique using a Secco type solution, as disclosed in paragraphs [0081]-[0085] of Barge, is silent as to any film including a device pattern, and thus cannot disclose removing such film. Accordingly, Barge fails to disclose the claimed “semiconductor wafer which comprises a film constituting a device structure including a device pattern,” and “removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer,” as recited in claim 9. Claim 9 is therefore allowable over Barge, and claims 10 and 12-14 are also allowable over Barge at least due to their dependence from claim 9.

Claim 23, although of different scope, recites features similar to those recited in claim 9. Therefore, claim 23 is also allowable over Barge for the reason set forth in regard to claim 9. Claim 24, which depends from claim 23, is allowable over Barge at least due to its dependence from claim 23.

Moreover, Applicants note that the Examiner has failed to properly point out how each and every element of claims 23 and 24 is taught in Barge. For example, the Examiner has failed to point out in the Barge reference at least “optimizing a manufacturing process for the semiconductor device or the shape of said device pattern on the basis of information on the crystal defect obtained from said quantitative evaluation so that the crystal defect is reduced,” as recited in claim 23. In fact, Barge is completely silent as to these limitations. Thus, claims 23 and 24 are allowable over Barge for this additional reason.

Regarding the rejection of claims 6, 32, and 33, the Examiner alleges that Barge discloses "using a third solution." Office Action at page 3. Claim 6, for example, recites "a third solution is an alkaline solution including at least one of choline, ammonia water and KOH." Although Barge discloses a Stage C of a solution of Secco type in paragraph [0084], Barge is silent as to any alkaline solution. Therefore, Barge fails to teach the claimed third solution which is "an alkaline solution including at least one of choline, ammonia water and KOH." Therefore, claim 6 is allowable over Barge.

Applicants respectfully traverse the Examiner's rejection of claims 8, 11, 25, and 34 under 35 U.S.C. § 103(a) as being unpatentable over Barge in view of Sato. A *prima facie* case of obviousness has not been established.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). M.P.E.P. § 2142, 8th Ed., Rev. 4 (October 2005), p. 2100-134.

A *prima facie* case of obviousness has not been established because, among other things, Barge and Sato, taken alone or in combination, fail to teach or suggest each and every element recited in claims 8, 11, 25, and 34. The Examiner alleges that although Barge fails to disclose the claimed concentration of HF, since Sato discloses a 49% solution of HF, "altering the concentration would be well known to those of ordinary skill in the art, and would etch the material faster." Office Action at page 4. However, this is not correct.

Claim 8 recites, among other things, “HF whose concentration is equal to or more than 33% and less than 49%.” While Sato teaches, in col. 25, lines 42-29, immersing SOI wafers for 3 minutes in hydrofluoric acid with an HF concentration of 49% by weight, contrary to the Examiner’s allegation, Sato does not teach the claimed range of HF concentration, and does not suggest such a concentration range of HF.

Moreover, Applicants’ Specification discloses the unexpected results and advantages of the HF concentration being equal to or more than 33% and less than 49%. See Applicants’ Specification at page 25, line 27 to page 26, line 8. See also in Fig. 13 the trade-off relationship between complete removal pit and residuals, illustrating that while the undesirable complete removal pits occur less frequently, more residuals are left at higher HF concentration. However, at the claimed HF concentration of equal to or more than 33% and less than 49%, these residuals can be prevented by applying an alkali treatment. Accordingly, superior results can be obtained by the claimed treatment method as recited in claim 8, including the HF concentration of equal to or more than 33% and less than 49%.

Therefore, Barge and Sato, either taken alone or in combination, fail to teach each and every element of claim 8, and accordingly no *prima facie* case of obviousness of claim 8 has been established. In addition, claims 11, 25, and 34, although of different scope, recite features similar to those recited in claim 8. Claims 8, 11, 25, and 34 are thus allowable over the Examiner’s proposed combination of Barge and Sato.

Applicants respectfully traverse the Examiner’s rejection of claim 22 under 35 U.S.C. § 103(a) as being unpatentable over Barge in view of Chiang. Claim 22 depends from claim 9 and thus require each and every element recited in claim 9.

Applicants have already established above in regard to the rejection of claim 9 that Barge fails to teach at least the claimed "film constituting a device structure including a device pattern," and "removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer." The Examiner relies on Chiang's disclosure to teach a use of ultrasonic waves to clean. However, even if Chiang teaches such a use of ultrasonic waves, Chiang still fails to teach the claimed "film constituting a device structure including a device pattern," and "removing said film with a chemical solution to expose the crystal surface of the semiconductor wafer," as recited in claim 9. Therefore, Chiang fails to overcome the shortcomings of Barge discussed in regard to claim 9, from which claim 22 depends. Accordingly, no *prima facie* case of obviousness has been established, and the 103(a) rejection of claim 22 should therefore be withdrawn.


In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

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By: 
Selah C. Park
Reg. No. 57,127